

What is claimed is:

- 1 1. A restraining and protecting apparatus for a vehicle
- 2 occupant comprising:
 - 3 a seat belt (3) to restrain a vehicle occupant on a seat;
 - 4 a belt adjusting unit (12) to adjust a state in which said
 - 5 vehicle occupant is restrained using said seat belt (3) by
 - 6 increasing or decreasing said seat belt (3) to be drawn out in
 - 7 length;
 - 8 a belt locking mechanism (17) to prevent said seat belt (3)
 - 9 from being drawn out by locking said seat belt (3);
 - 10 an "immediately before collision" signal producing section
 - 11 (11) to produce and output an "immediately before collision"
 - 12 signal immediately before occurrence of a collision of said
 - 13 vehicle;
 - 14 a locking signal producing section (18) to produce and
 - 15 output a locking signal when it is predicted at least that said
 - 16 belt locking mechanism (17) is in a lockable state where
 - 17 inhibition of drawing out is made possible when said seat belt
 - 18 (3) is going to be drawn out;
 - 19 a controlling section (24) to control said belt adjusting
 - 20 unit (12) based on said "immediately before collision" signal
 - 21 to be input and said locking signal to be input; and
 - 22 wherein said controlling section (24) exerts control in a
 - 23 manner that, when said "immediately before collision" signal is
 - 24 input, said belt adjusting unit (12) increases said state in which
 - 25 said vehicle occupant is restrained using said seat belt (3) and
 - 26 that, when said locking signal is not input, said belt adjusting
 - 27 unit (12) weakens said state in which said vehicle occupant is

28 restrained using said seat belt (3).

1 2. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 1, wherein said belt locking mechanism
3 (17) in said lockable state, when said belt adjusting unit (12)
4 is controlled by said controlling section (24) so as to increase
5 said state in which said vehicle occupant is restrained using said
6 seat belt (3), is put in a state of releasing locking in which
7 said seat belt (3) is able to be drawn out.

1 3. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 1 or Claim 2, wherein said controlling
3 section (24) exerts control so that, while said locking signal
4 is input, said belt adjusting unit (12) increases and maintains
5 said state in which said vehicle occupant is restrained using said
6 seat belt (3).

1 4. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 3, wherein said controlling section
3 (24) exerts control so that said belt adjusting unit (12), when
4 a predetermined time has elapsed after said locking signal has
5 been input, weakens said state in which said vehicle occupant is
6 restrained using said seat belt (3).

1 5. The restraining and protecting apparatus for a vehicle
2 occupant according to any one of Claim 1 to Claim 4, wherein said
3 controlling section (24) exerts control when said "immediately
4 before collision" signal is input so that said belt adjusting
5 unit (12) increases said state in which said vehicle occupant is

6 restrained using said seat belt (3) and that said belt adjusting
7 unit (12), said state in which said vehicle occupant is restrained
8 using said seat belt (3) is changed to a state in which said vehicle
9 occupant is restrained to a predetermined extent and when said
10 locking signal is not input, weakens said state in which said
11 vehicle occupant is restrained using said seat belt (3).

1 6. The restraining and protecting apparatus for a vehicle
2 occupant according to any one of Claim 1 to Claim 5, wherein said
3 locking signal producing section (18) outputs said locking signal
4 when at least part of conditions under which drawing of said seat
5 belt (3) is inhibited by said belt locking mechanism (17) is met.

1 7. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 6, wherein said seat belt (3) is locked
3 under condition that acceleration in a back-and-forth or lateral
4 direction of said vehicle exceeds a predetermined value.

1 8. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 6, wherein said seat belt (3) is locked
3 under condition that acceleration at which said seat belt (3) is
4 drawn out exceeds a predetermined value.

1 9. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 7 or Claim 8, wherein said
3 acceleration includes acceleration in a direction being reverse
4 to a direction of a velocity of said vehicle.

1 10. The restraining and protecting apparatus for a vehicle

2 occupant according to any one of Claim 1 to Claim 5, wherein said
3 locking signal producing section (18), when a state in which said
4 belt locking mechanism (17) is in a lockable state is detected,
5 outputs said locking signal.

1 11. The restraining and protecting apparatus for a vehicle
2 occupant according to any one of Claim 1 to Claim 10, wherein said
3 belt adjusting unit (12) has a motor to retract said seat belt
4 (3) and wherein said controlling section (13), where said
5 "immediately before collision" signal is input, controls said
6 motor to increase its driving power and to increase said state
7 in which said vehicle occupant is restrained using said seat belt
8 (3) and exerts control so that, said belt adjusting unit (12),
9 when said locking signal is not input, weakens said state in which
10 said vehicle occupant is restrained using said seat belt (3).

1 12. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 11, wherein said controlling section
3 (13), while said locking signal is input, controls said motor
4 serving as said belt adjusting unit (12) so as to have said seat
5 belt (3) retracted.

1 13. The restraining and protecting apparatus for a vehicle
2 occupant according to any one of Claim 1 to Claim 12, wherein said
3 "immediately before collision" signal producing section (11),
4 based on a detection signal obtained from a non-contact type
5 distance sensor, calculates a speed of said vehicle relative to
6 an obstruction existing in a front of said vehicle and, based on
7 a result from calculation, judges as to whether there is a

8 possibility of occurrence of collision between said vehicle and
9 said obstruction and also judges, when there is a possibility of
10 collision, as to whether said avoidance of collision is possible
11 or not.

1 14. The restraining and protecting apparatus for a vehicle
2 occupant according to any one of Claim 1 to Claim 13, wherein said
3 "immediately before collision" signal producing section (11),
4 when a detection of an operation for collision avoidance is made,
5 outputs said "immediately before collision" signal.

1 15. The restraining and protecting apparatus for a vehicle
2 occupant according to Claim 14, wherein said "immediately before
3 collision " signal producing section (11) outputs said
4 "immediately before collision" signal when detection of a rapid
5 brake operation or a rapid handle operation for collision
6 avoidance is made by being recognized that acceleration in a
7 back-and-forth or lateral direction of said vehicle exceeds a
8 predetermined value.